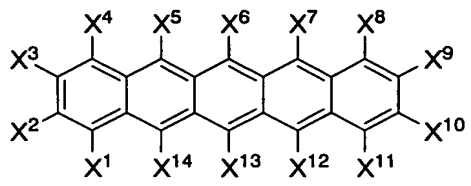
CLAIMS

[1] A compound represented by formula [1]

[Formula 1]



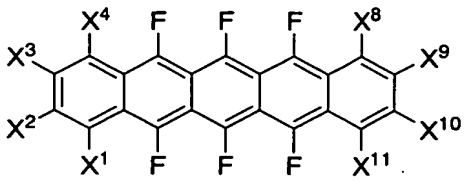
[1]

(wherein X^1, X^2, X^3, X^4, X^5, X^6, X^7, X^8, X^9, X^{10}, X^{11}, X^{12}, X^{13}, and X^{14} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group)

wherein the groups in at least one pair selected from the group consisting of the pair X^5 and X^{14}, the pair X^6 and X^{13}, and the pair X^7 and X^{12} are both fluorine.

[2] A compound represented by formula [2]

[Formula 2]

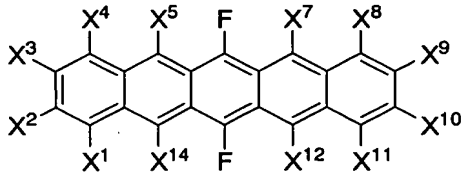


[2]

(wherein X^1, X^2, X^3, X^4, X^8, X^9, X^{10}, and X^{11} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group).

[3] Formula [3]

[Formula 3]

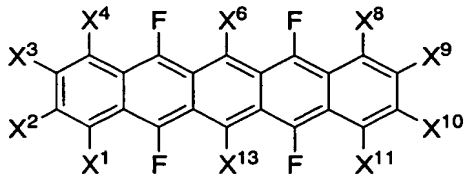


[3]

(wherein X^1, X^2, X^3, X^4, X^5, X^7, X^8, X^9, X^{10}, X^{11}, X^{12}, and X^{14} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group).

[4] Formula [4]

[Formula 4]

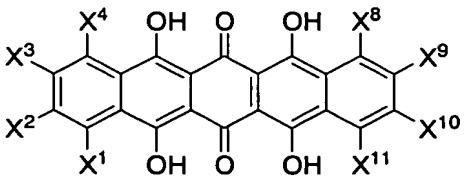


[4]

(wherein X^1, X^2, X^3, X^4, X^6, X^8, X^9, X^{10}, X^{11}, and X^{13} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group).

[5] A method of producing a compound represented by formula [13]

[Formula 7]



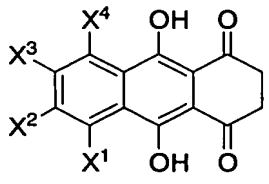
[13]

(wherein X^1, X^2, X^3, X^4, X^8, X^9, X^{10}, and X^{11} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted

or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group), comprising the step of

producing a compound represented by formula [13] by reacting a compound represented by formula [11]

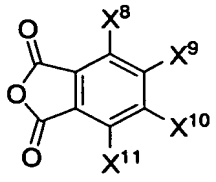
[Formula 5]



[11]

(wherein X^1, X^2, X^3, and X^4 represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group) with a compound represented by formula [12]

[Formula 6]



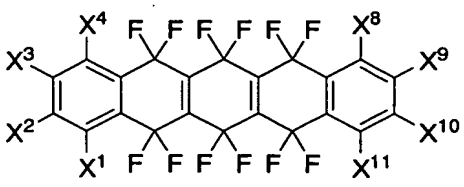
[12]

(wherein X^8, X^9, X^{10}, and X^{11} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group) in the presence of a Lewis acid.

[6] The production method according to claim 5, wherein the Lewis acid comprises aluminum chloride.

[7] A method of producing a compound represented by formula [14]

[Formula 9]

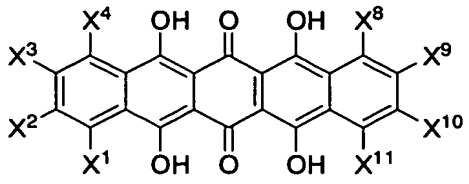


[14]

(wherein X^1, X^2, X^3, X^4, X^8, X^9, X^{10}, and X^{11} are defined as for formula [13]), comprising the step of

producing a compound represented by formula [14] by reacting a compound represented by formula [13]

[Formula 8]

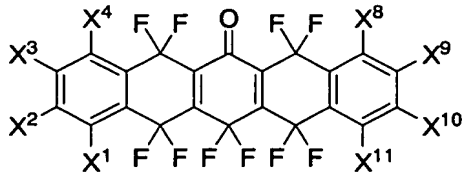


[13]

(wherein X^1, X^2, X^3, X^4, X^8, X^9, X^{10}, and X^{11} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group) with a fluorinating agent.

[8] A method of producing a compound represented by formula [15]

[Formula 11]

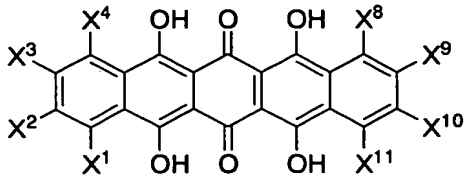


[15]

(wherein X^1, X^2, X^3, X^4, X^8, X^9, X^{10}, and X^{11} are defined as for formula [13]), comprising the step of

producing a compound represented by formula [15] by reacting a compound represented by formula [13]

[Formula 8]

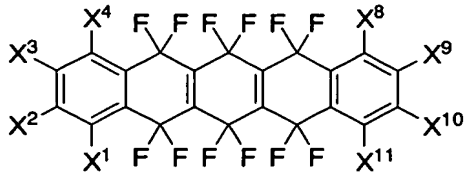


[13]

(wherein X^1, X^2, X^3, X^4, X^8, X^9, X^{10}, and X^{11} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group) with a fluorinating agent.

[9] A method of producing a compound represented by formula [14]

[Formula 13]

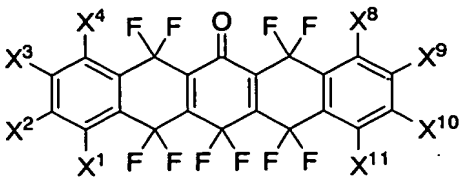


[14]

(wherein X^1, X^2, X^3, X^4, X^8, X^9, X^{10}, and X^{11} are defined as for formula [15]), comprising the step of

producing a compound represented by formula [14] by reacting a compound represented by formula [15]

[Formula 12]

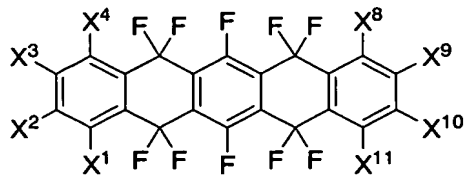


[15]

(wherein X^1, X^2, X^3, X^4, X^8, X^9, X^{10}, and X^{11} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group) with a fluorinating agent.

[10] A method of producing a compound represented by formula [16]

[Formula 15]

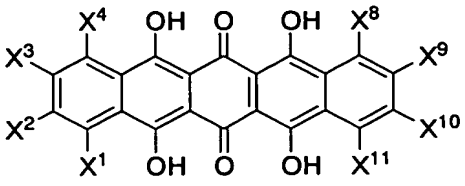


[16]

(wherein X^1, X^2, X^3, X^4, X^8, X^9, X^{10}, and X^{11} are defined as for formula [13]), comprising the step of

producing a compound represented by formula [16] by reacting a compound represented by formula [13]

[Formula 14]



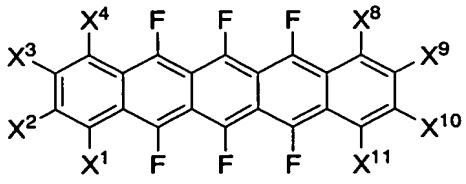
[13]

(wherein X^1, X^2, X^3, X^4, X^8, X^9, X^{10}, and X^{11} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group) with a fluorinating agent.

[11] The production method according to any of claims 7 to 10, wherein the fluorinating agent comprises sulfur tetrafluoride.

[12] A method of producing a compound represented by formula [2]

[Formula 17]

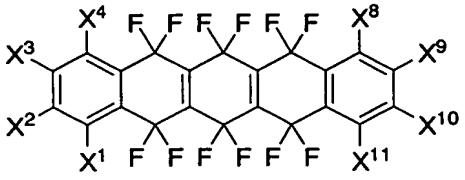


[2]

(wherein X^1, X^2, X^3, X^4, X^8, X^9, X^{10}, and X^{11} are defined as for formula [14]), comprising the step of

producing a compound represented by formula [2] by reacting a compound represented by formula [14]

[Formula 16]

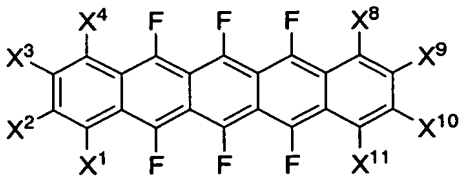


[14]

(wherein X^1, X^2, X^3, X^4, X^8, X^9, X^{10}, and X^{11} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group) with a reducing agent.

[13] A method of producing a compound represented by formula [2]

[Formula 19]



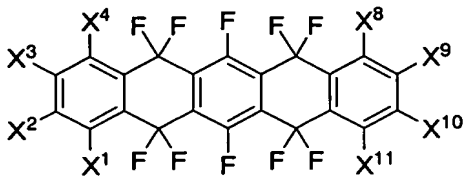
[2]

(wherein X^1, X^2, X^3, X^4, X^8, X^9, X^{10}, and X^{11} are defined as for formula [16]), comprising the step of

producing a compound represented by formula [2] by

reacting a compound represented by formula [16]

[Formula 18]



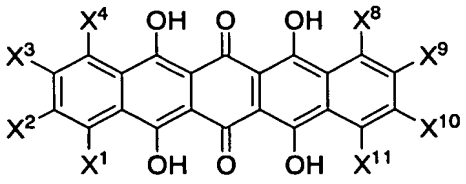
[16]

(wherein X^1, X^2, X^3, X^4, X^8, X^9, X^{10}, and X^{11} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group) with a reducing agent.

[14] The production method according to claim 12 or 13, wherein the reducing agent comprises zinc, iron, copper, nickel, palladium, or a combination thereof.

[15] A compound represented by formula [13]

[Formula 20]



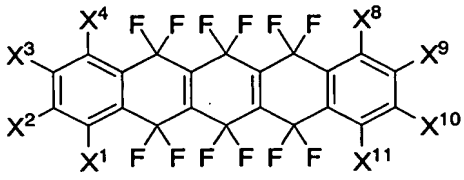
[13]

(wherein X^1, X^2, X^3, X^4, X^8, X^9, X^{10}, and X^{11} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8}

alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group).

[16] A compound represented by formula [14]

[Formula 21]

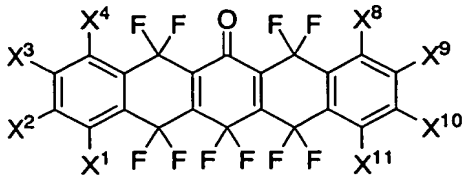


[14]

(wherein X^1, X^2, X^3, X^4, X^8, X^9, X^{10}, and X^{11} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group).

[17] A compound represented by formula [15]

[Formula 22]

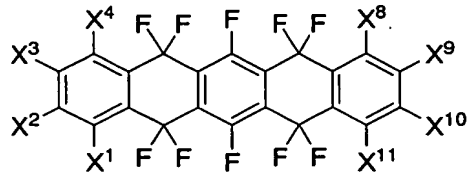


[15]

(wherein X^1, X^2, X^3, X^4, X^8, X^9, X^{10}, and X^{11} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group).

[18] A compound represented by formula [16]

[Formula 23]



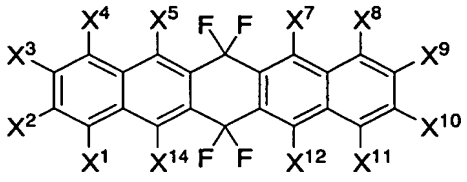
[16]

(wherein X^1, X^2, X^3, X^4, X^8, X^9, X^{10}, and X^{11} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or

different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group).

[19] A method of producing a compound represented by formula [22]

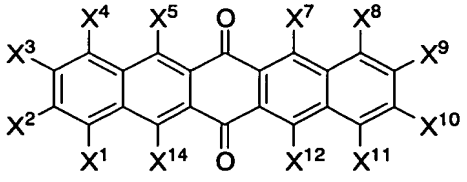
[Formula 25]



[22]

(wherein X^1, X^2, X^3, X^4, X^5, X^7, X^8, X^9, X^{10}, X^{11}, X^{12}, and X^{14} are defined as for formula [21]), comprising the step of producing a compound represented by formula [22] by reacting a compound represented by formula [21]

[Formula 24]



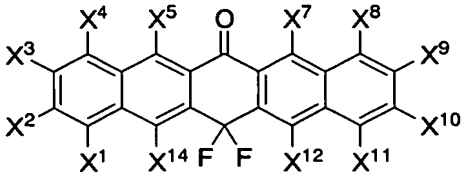
[21]

(wherein X^1, X^2, X^3, X^4, X^5, X^7, X^8, X^9, X^{10}, X^{11}, X^{12}, and X^{14} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a

monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group) with a fluorinating agent.

[20] A method of producing a compound represented by formula [23]

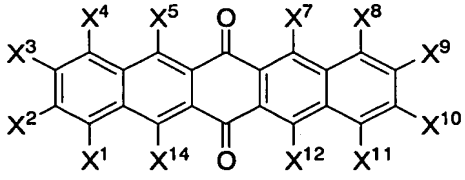
[Formula 27]



[23]

(wherein X^1, X^2, X^3, X^4, X^5, X^7, X^8, X^9, X^{10}, X^{11}, X^{12}, and X^{14} are defined as for formula [21]), comprising the step of producing a compound represented by formula [23] by reacting a compound represented by formula [21]

[Formula 26]



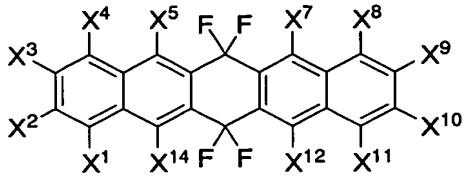
[21]

(wherein X^1, X^2, X^3, X^4, X^5, X^7, X^8, X^9, X^{10}, X^{11}, X^{12}, and X^{14} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or

X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group) with a fluorinating agent.

[21] A method of producing a compound represented by formula [22]

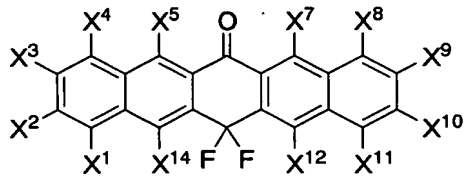
[Formula 29]



[22]

(wherein X^1, X^2, X^3, X^4, X^5, X^7, X^8, X^9, X^{10}, X^{11}, X^{12}, and X^{14} are defined as for formula [23]), comprising the step of producing a compound represented by formula [22] by reacting a compound represented by formula [23]

[Formula 28]



[23]

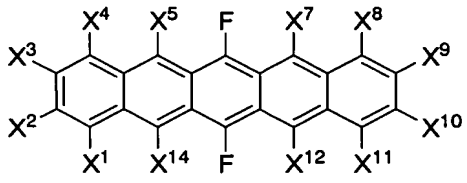
(wherein X^1, X^2, X^3, X^4, X^5, X^7, X^8, X^9, X^{10}, X^{11}, X^{12}, and X^{14} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed

polycyclic hydrocarbon group) with a fluorinating agent.

[22] The production method according to any of claims 19 to 21, wherein the fluorinating agent comprises sulfur tetrafluoride.

[23] A method of producing a compound represented by formula [3]

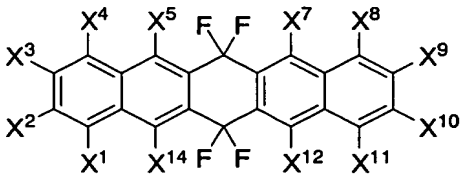
[Formula 31]



[3]

(wherein X^1, X^2, X^3, X^4, X^5, X^7, X^8, X^9, X^{10}, X^{11}, X^{12}, and X^{14} are defined as for formula [22]), comprising the step of producing a compound represented by formula [3] by reacting a compound represented by formula [22]

[Formula 30]



[22]

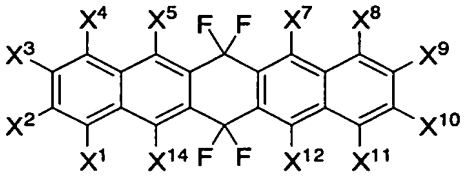
(wherein X^1, X^2, X^3, X^4, X^5, X^7, X^8, X^9, X^{10}, X^{11}, X^{12}, and X^{14} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a

monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group) with a reducing agent.

[24] The production method according to claim 23, wherein the reducing agent comprises zinc, iron, copper, nickel, palladium, or a combination thereof.

[25] A compound represented by formula [22]

[Formula 32]

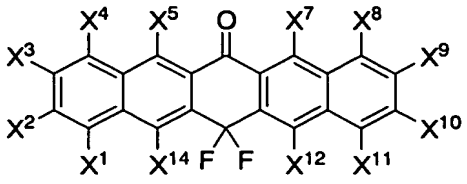


[22]

(wherein X^1, X^2, X^3, X^4, X^5, X^7, X^8, X^9, X^{10}, X^{11}, X^{12}, and X^{14} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group).

[26] A compound represented by formula [23]

[Formula 33]

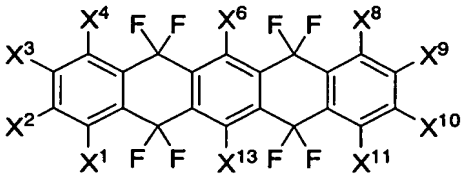


[23]

(wherein X^1, X^2, X^3, X^4, X^5, X^7, X^8, X^9, X^{10}, X^{11}, X^{12}, and X^{14} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group).

[27] A method of producing a compound represented by formula [32]

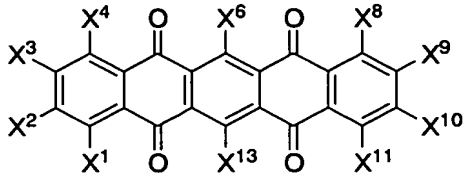
[Formula 35]



[32]

(wherein X^1, X^2, X^3, X^4, X^6, X^8, X^9, X^{10}, X^{11}, and X^{13} are defined as for formula [31]), comprising the method of producing a compound represented by formula [32] by reacting a compound represented by formula [31]

[Formula 34]

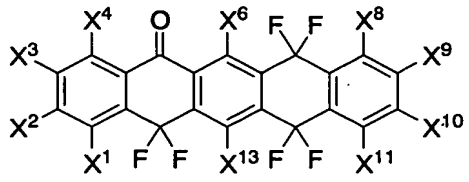


[31]

(wherein X^1, X^2, X^3, X^4, X^6, X^8, X^9, X^{10}, X^{11}, and X^{13} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group) with a fluorinating agent.

[28] A method of producing a compound represented by formula [33]

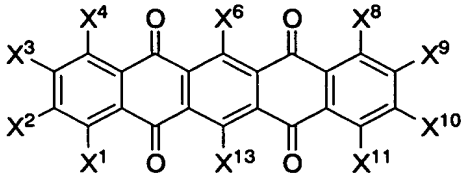
[Formula 37]



[33]

(wherein X^1, X^2, X^3, X^4, X^6, X^8, X^9, X^{10}, X^{11}, and X^{13} are defined as for formula [31]), comprising the method of producing a compound represented by formula [33] by reacting a compound represented by formula [31]

[Formula 36]

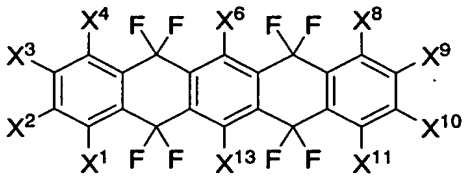


[31]

(wherein X^1, X^2, X^3, X^4, X^6, X^8, X^9, X^{10}, X^{11}, and X^{13} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group) with a fluorinating agent.

[29] A method of producing a compound represented by formula [32]

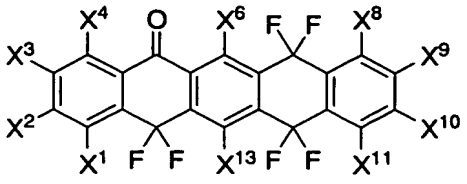
[Formula 39]



[32]

(wherein X^1, X^2, X^3, X^4, X^6, X^8, X^9, X^{10}, X^{11}, and X^{13} are defined as for formula [33]), comprising the method of producing a compound represented by formula [32] by reacting a compound represented by formula [33]

[Formula 38]



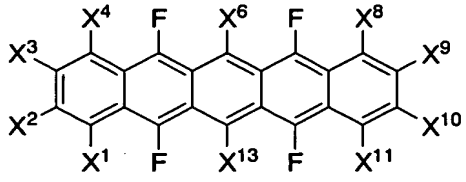
[33]

(wherein X^1, X^2, X^3, X^4, X^6, X^8, X^9, X^{10}, X^{11}, and X^{13} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group) with a fluorinating agent.

[30] The production method according to any of claims 27 to 29, wherein the fluorinating agent comprises sulfur tetrafluoride.

[31] A method of producing a compound represented by formula [4]

[Formula 41]

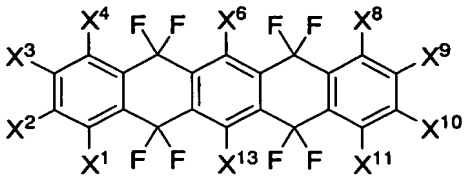


[4]

(wherein X^1, X^2, X^3, X^4, X^6, X^8, X^9, X^{10}, X^{11}, and X^{13} are defined as for formula [32]), comprising the method of producing a compound represented by formula [4] by

reacting a compound represented by formula [32]

[Formula 40]



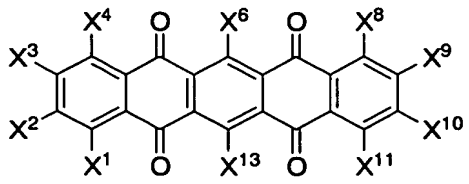
[32]

(wherein X^1, X^2, X^3, X^4, X^6, X^8, X^9, X^{10}, X^{11}, and X^{13} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group) with a reducing agent.

[32] The production method according to claim 31, wherein the reducing agent comprises zinc, iron, copper, nickel, palladium, or a combination thereof.

[33] A compound represented by formula [31]

[Formula 42]



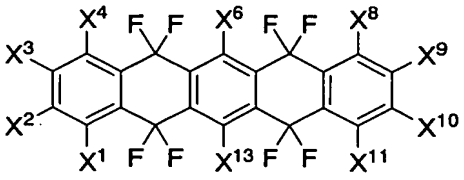
[31]

(wherein X^1, X^2, X^3, X^4, X^6, X^8, X^9, X^{10}, X^{11}, and X^{13} represent fluorine, hydrogen, a substituted or

unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group).

[34] A compound represented by formula [32]

[Formula 43]



[32]

(wherein X^1, X^2, X^3, X^4, X^6, X^8, X^9, X^{10}, X^{11}, and X^{13} represent fluorine, hydrogen, a substituted or unsubstituted C_{1-8} alkyl group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted anthracenyl group, a substituted or unsubstituted naphthacenyl group, or a substituted or unsubstituted pentacenyl group, and may be the same or different; or X^2 is bonded to X^3 to form a monocyclic or condensed polycyclic hydrocarbon group and/or X^9 is bonded to X^{10} to form a monocyclic or condensed polycyclic hydrocarbon group).